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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name	R1234ze (HFO-1234ze)
Chemical description	Trans-1,3,3,3-Tetrafluoroprop-1-ene
CAS N°	29118-24-9
CE N°	471-480-0
Index N°	--
Registration n°	01-0000019758-54
Chemical formula	CHF=CH-CF ₃

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Industrial and professional Test or calibration gas Manufacture of electronic or photovoltaic components Refrigerant Laboratory use Contact supplier for more information on uses
Uses advised against	Consumer use not recommended

1.3. Details of the supplier of the safety data sheet

Company identification	MULTIGAS Route de l'Industrie 102 CH-1564 Domdidier
Phone number	+41 (0) 26 676 94 94
E-mail address	info@multigas.ch

1.4. Emergency telephone numbers

145 (Toxicology Centre Zurich) or +41 (0) 44 251 51 51
+41 (0) 26 676 94 94 (Multigas)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Gases under pressure : Liquefied gas

H280

For the complete H-sentences texts mentioned in that chapter, refer to Section 16

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2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms



GHS04

Signal word

Attention

Hazard statements

H280 Contains gas under pressure; may explode if heated

Precautionary statements

P410+403 Protect from sunlight. Store in a well-ventilated place

2.3. Other hazards

Misuse or intentional intentional inhalation can cause death without warning symptoms due to cardiac effects

Suffocation by reduction of oxygen content (vapours heavier than air)

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	Concentration	Classification
Trans-1,3,3,3-Tetrafluoroprop-1-ene (HFO-1234ze)	(CAS-No.) 29118-24-9 (EC-No.) 471-480-0 (EC Index-No.) -- (Registration-No.) 01-0000019758-54	≥ 99.5%	Press. Gas (Liq.), H280

For the complete H-sentences texts mentioned in that chapter, refer to Section 16

Contains no other components or impurities which will influence the classification of the product

3.2. Mixtures

Not established

SECTION 4: First aid measures


4.1. Description of first aid measures

General advice

See a doctor. Show this safety data sheet to the attending physician

In case of inhalation

In case of inhalation, remove the person from the contaminated area. In case of respiratory arrest, give artificial respiration. See a doctor

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In case of skin contact	Frostbites are to be treated like thermal burns: immediate, abundant and prolonged wash with water
In case of eyes contact	Immediate washing, abundant and prolonged with water. If irritation persists, consult a doctor
In case of ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. See a doctor

4.2. Most important symptoms and effects, both acute and delayed

Misuse or intentional intentional inhalation can cause death without warning symptoms due to cardiac effects. Other symptoms that may be related to misuse or abusive inhalation are: anesthetic effects, dizziness, vertigo, confusion, lack of coordination, drowsiness or unconsciousness
Refer to section 11

4.3. Indication of any immediate medical attention and special treatment needed

Do not give adrenaline or similar drugs

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	Water spray or water mist. Dry powder. Carbon dioxide. Foam
Unsuitable extinguishing media	Do not use water jet to extinguish

5.2. Special hazards arising from the substance or mixture

Specific hazards	In case of fire or excessive heat, hazardous combustion products may be produced Exposure to fire may cause containers to rupture/explode
Hazardous combustion products	In case of fire or excessive heat, hazardous combustion products may be produced such as : carbon monoxide


5.3. Additional information

Cool endangered receptacles with water spray jet from a protected position

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Avoid breathing vapours, spray mists or gases
Provide adequate ventilation
Evacuate personnel to a safe place
Personal protective equipment, see section 8

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6.2. Environmental precautions

Avoid release to the environment.
 Avoid spillage or leakage.
 Contaminated wash water should be retained and disposed of

6.3. Methods and material for containment and cleaning up

Provide adequate ventilation

6.4. Reference to other sections

See also sections 8 and 13

SECTION 7: Handling and storage

7.1. Precautions for safe handling

For precautions, see section 2.2

7.2. Conditions for safe storage, including any incompatibilities

Store in a cool place. Keep container tightly closed in a dry and well-ventilated place
 Content under pressure
 Storage life: > 10 years
 Recommended storage temperature: < 52 °C

7.3. Specific end use(s)


None

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Components with occupational exposure limits

Component	CAS N°	Exposure value type	Control parameter	Source
Trans 1,3,3,3-Tetrafluoroprop-1-ene (HFO-1234ze)	29118-24-9	TWA	1'000 ppm	SUVA: Limit values of exposure to workstations
			4'700 mg/m ³	
		OEL	2'000 ppm	SUVA: Limit values of exposure to workstations
			9'400 mg/m ³	

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8.2. Exposure controls

8.2.1. Appropriate engineering controls

Provide adequate general and local exhaust ventilation
Gas detectors should be used when flammable gases may be released

8.2.2. Individual protection measures, e.g. personal protective equipment

Eye/face protection	Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166
Skin / hand protection	<p>Wear protective gloves when handling gas cylinders Standard EN 388- Protective gloves against mechanical hazards</p> <p>The selected protective gloves have to satisfy the specifications of EU Directive 89/686 / EEC and the standard EN 374 derived from it</p> <p>For short-term use</p> <p>Material: Fluoroelastomer Penetration time: >30 min Glove thickness: 0.4 mm</p> <p>For long-term use</p> <p>Material: Fluoroelastomer Penetration time: >480 min Glove thickness: 0.7 mm</p> <p>Have appropriate, chemical-resistant protective clothing ready for use in emergencies</p>
Respiratory protection	Self-contained breathing apparatus (SCBA) or positive pressure air mask must be used in oxygenated atmospheres. Standard EN 137 - Self-contained compressed air device with a full face mask

8.2.3. Environmental exposure controls


-

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

• Physical state at 20°C / 101.3kPa	Gas
• Colour	Colourless
Odour	Slightly ethereal
Odour threshold	No data available
pH	No data available
Melting point / Freezing point	No data available
Boiling point	-19°C

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Flash point	No data available
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Explosive limits	None under standard conditions (20°C) However, there are limits at different temperatures: (according to ASTM E681-01 at 60°C: 5.7% - 11.3%)
Vapour pressure [20°C]	4.3 bar
Vapour pressure [50°C]	10.0 bar
Vapour density	No data available
Relative density, liquid (water=1)	1.2
Relative density, gas (air=1)	4
Water solubility	0.37 g/l
Partition coefficient n-octanol/water (Log Kow)	Log Pow 1.6
Auto-ignition temperature	368°C
Decomposition temperature	>370°C
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

9.2. Other information

Molar mass	114.0 g/mol
Critical temperature [°C]	109.4°C
Relative vapour density	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level

SECTION 10: Stability and reactivity

10.1. Reactivity


No reactivity hazard other than the effects described in sub-sections below

10.2. Chemical stability

Stable under recommended storage conditions

10.3. Possibility of hazardous reactions

The gaseous product in the presence of air can form a flammable mixture under certain temperature and pressure conditions

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10.4. Conditions to avoid

Keep away from heat and sources of ignition. Avoid contact with flames and red-hot metal surfaces. May form combustible mixture with air at pressures above atmospheric.

10.5. Incompatible materials

Alkali metals and strong oxidants
For additional information on compatibility refer to ISO 11114

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced

SECTION 11: Toxicological information

11.1. Chemical safety assessment

Acute toxicity	Toxicological effects not expected from this product
Skin corrosion/irritation	No data available
Serious eye damage/irritation	No data available
Respiratory or skin sensitisation	No data available
Germ cell mutagenicity	No data available
Carcinogenicity	No data available
Reproductive toxicity	No data available
STOT-single exposure – Target organ(s)	No data available
STOT-repeated exposure	No data available
Ingestion hazard	No data available

SECTION 12: Ecological information

12.1. Toxicity

Assessment Not harmful to fish, Not harmful to Daphnia, Not harmful to algae

12.2. Persistence and degradability


No data available

12.3. Bioaccumulative potential

No data available

12.4. Mobility in soil

No data available

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12.5. Results of PBT and vPvB assessment

PBT / vPvB assessment is not available because the chemical safety assessment is not required / is not conducted

12.6. Other adverse effects

Global Warming Potential (GWP) (CO₂ = 1): 7

Ozone Depletion Potential (ODP) (R-11 = 1): 0

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product	<p>Must not be discharged to atmosphere</p> <p>Burn in a chemical incinerator equipped with an afterburner and scrubber</p> <p>Return unused product in original cylinder to supplier</p>
Contaminated container	<p>Return unused product in original cylinder to supplier</p> <p>Contact the supplier if instructions are needed</p>
OMoD Code	<p>14 06 01</p> <p>Solvent, refrigerant and aerosol propellant or organic foam wastes: Chlorofluorocarbons, HCFCs, HFCs</p>

SECTION 14: Transport information

14.1. UN number

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
1078	1078	1078

14.2. UN proper shipping name

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
Liquified gas, non-flammable N.O.S (Trans 1,3,3,3-Tetrafluoroprop-1-ene)	Liquified gas, non-flammable N.O.S (Trans 1,3,3,3-Tetrafluoroprop-1-ene)	Liquified gas, non-flammable N.O.S (Trans 1,3,3,3-Tetrafluoroprop-1-ene)


14.3. Transport hazard class(es)

Labelling



ADR/RID
IMDG
IATA

2.2 : Non-flammable gases, non-toxic gases

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14.4. Packing group

ADR/RID	Not established
IMDG	
IATA	

14.5. Environmental hazards

ADR/RID	None
IMDG	None
ICAO-TI / IATA-DGR	None

14.6. Special precautions for user

No data available

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture


This safety data sheet complies with the requirements of Regulation (CE) No. 1907/2006

15.2. Chemical safety assessment

A CSA has been carried out

SECTION 16: Other information

Indication of changes	Revised safety data sheet in accordance with commission regulation (EU) No 2015/830
Abbreviations and acronyms	<p>ADR : European Agreement concerning the International Carriage of Dangerous Goods by Road</p> <p>CAS : Chemical Abstract Service number (USA)</p> <p>CLP : Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008</p> <p>CSA : Chemical Safety Assessment</p> <p>EIGA : European Industrial Gases Association</p> <p>EINECS : European Inventory of Existing Commercial Chemical Substances</p> <p>EN : European Standard</p> <p>ATE : Acute Toxicity Estimate</p> <p>IATA : International Air Transport Association</p> <p>IMDG Code : International Maritime Dangerous Goods Code</p> <p>LC50 : Lethal Concentration to 50 % of a test population</p>

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OMoD :	Swiss Ordinance on the movement of waste
PBT :	Persistent, Bioaccumulative and Toxic
PPE:	Personal Protection Equipment
REACH :	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID :	Regulations concerning the international carriage of dangerous goods by rail
RMM :	Risk Management Measures
STOT-SE :	Specific Target Organ Toxicity - Single Exposure
UN :	United Nations
vPvB :	Very Persistent and Very Bioaccumulative
WGK:	Water Hazards Class

Full text of H, EUH and P statements used in sections 2 and 3

Hazard statements

H280 Contains gas under pressure; may explode if heated

Precautionary statements

P410+403 Protect from sunlight. Store in a well-ventilated place

Disclaimer of liability

Details given in this document have been prepared based on the most available reliable documents and are believed to be correct at the time of going to press

They do not claim to be exhaustive and should be considered as a guide